



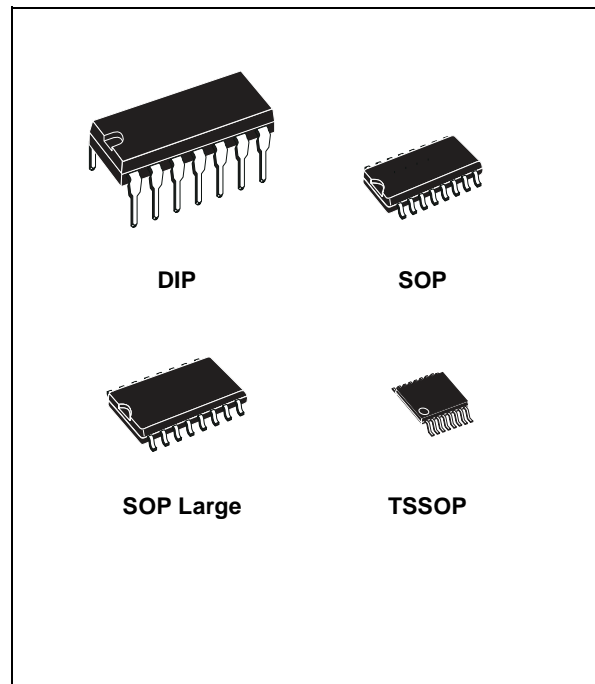
ST232A

VERY HIGH SPEED, ULTRA LOW POWER CONSUMPTION 5V POWERED RS-232 DRIVERS AND RECEIVERS

- SUPPLY VOLTAGE RANGE: 4.5 TO 5.5V
- SUPPLY CURRENT NO LOAD (TYP): 1.5mA
- TRANSMITTER OUTPUT VOLTAGE SWING (TYP): $\pm 9V$
- TRANSITION SLEW RATE (TYP.): 12V/ μs
- RECEIVER PROPAGATION DELAY (TYP.): 0.1 μs
- RECEIVER INPUT VOLTAGE RANGE: $\pm 30V$
- DATA RATE (TYP.): 400Kbp/s
- OPERATING TEMPERATURE RANGE: -40 TO 85 °C, 0 TO 70°C

DESCRIPTION

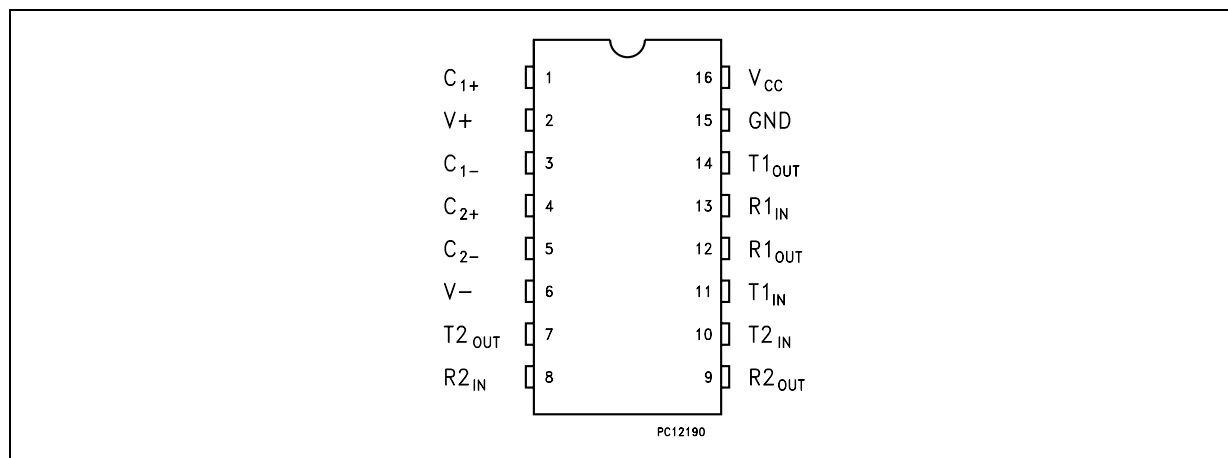
The ST232A is a 2 driver, 2 receiver device following EIA/TIA-232 and V.28 communication standard. It is particularly suitable for applications where $\pm 12V$ is not available. The ST232 uses a single 5V power supply and only four external capacitors (0.1 μF). Typical applications are in: Portable Computers, Low Power Modems, Interfaces Translation, Battery Powered RS-232 Networks.



ORDERING CODES

| Type | Temperature Range | Package | Comments |
|-----------|-------------------|---------------------------|-----------------------------------|
| ST232ACN | 0 to 70 °C | DIP-16 | 25parts per tube / 40tube per box |
| ST232ABN | -40 to 85 °C | DIP-16 | 25parts per tube / 40tube per box |
| ST232ACD | 0 to 70 °C | SO-16 (Tube) | 49parts per tube / 25tube per box |
| ST232ABD | -40 to 85 °C | SO-16 (Tube) | 49parts per tube / 25tube per box |
| ST232ACDR | 0 to 70 °C | SO-16 (Tape & Reel) | 2500 parts per reel |
| ST232ABDR | -40 to 85 °C | SO-16 (Tape & Reel) | 2500 parts per reel |
| ST232ACW | 0 to 70 °C | SO-16 Large (Tube) | 50parts per tube / 20tube per box |
| ST232ABW | -40 to 85 °C | SO-16 Large (Tube) | 50parts per tube / 20tube per box |
| ST232ACWR | 0 to 70 °C | SO-16 Large (Tape & Reel) | 1000 parts per reel |
| ST232ABWR | -40 to 85 °C | SO-16 Large (Tape & Reel) | 1000 parts per reel |
| ST232ACTR | 0 to 70 °C | TSSOP16 (Tape & Reel) | 2500 parts per reel |
| ST232ABTR | -40 to 85 °C | TSSOP16 (Tape & Reel) | 2500 parts per reel |

PIN CONFIGURATION



PIN DESCRIPTION

| PIN N° | SYMBOL | NAME AND FUNCTION |
|--------|-------------------|--|
| 1 | C ₁₊ | Positive Terminal for the first Charge Pump Capacitor |
| 2 | V+ | Doubled Voltage Terminal |
| 3 | C ₁₋ | Negative Terminal for the first Charge Pump Capacitor |
| 4 | C ₂₊ | Positive Terminal for the second Charge Pump Capacitor |
| 5 | C ₂₋ | Negative Terminal for the second Charge Pump Capacitor |
| 6 | V- | Inverted Voltage Terminal |
| 7 | T _{2OUT} | Second Transmitter Output Voltage |
| 8 | R _{2IN} | Second Receiver Input Voltage |
| 9 | R _{2OUT} | Second Receiver Output Voltage |
| 10 | T _{2IN} | Second Transmitter Input Voltage |
| 11 | T _{1IN} | First Transmitter Input Voltage |
| 12 | R _{1OUT} | First Receiver Output Voltage |
| 13 | R _{1IN} | First Receiver Input Voltage |
| 14 | T _{1OUT} | First Transmitter Output Voltage |
| 15 | GND | Ground |
| 16 | V _{CC} | Supply Voltage |

ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---------------------|--|---------------------------------|------|
| V _{CC} | Supply Voltage | -0.3 to 6 | V |
| V+ | Extra Positive Voltage | (V _{CC} - 0.3) to 13.2 | V |
| V- | Extra Negative Voltage | 0.3 to -13.2 | V |
| T _{IN} | Transmitter Input Voltage Range | -0.3 to (V _{CC} + 0.3) | V |
| R _{IN} | Receiver Input Voltage Range | ± 30 | V |
| T _{OUT} | Transmitter Output Voltage Range | ± 15 | V |
| R _{OUT} | Receiver Output Voltage Range | -0.3 to (V _{CC} + 0.3) | V |
| T _{SCTOUT} | Short Circuit Duration on T _{OUT} | infinite | |

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

ELECTRICAL CHARACTERISTICS(C₁ - C₄ = 0.1μF, V_{CC} = 5V ± 10%, T_A = -40 to 85°C, unless otherwise specified.Typical values are referred to T_A = 25°C)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------|--------------------------------------|-----------------|------|------|------|------|
| I _{SUPPLY} | V _{CC} Power Supply Current | No Load | | 1.5 | 4 | mA |

TRANSMITTER ELECTRICAL CHARACTERISTICS(C₁ - C₄ = 0.1μF, V_{CC} = 5V ± 10%, T_A = -40 to 85°C, unless otherwise specified.Typical values are referred to T_A = 25°C)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-------------------|--|---|------|------|------|---------|
| V _{TOUT} | Output Voltage Swing | All Transmitter outputs are loaded with 3KΩ to GND | ± 5 | ± 9 | | V |
| I _{TIL} | Logic Pull-Up Current | T _{IN} = 0V | | 5 | 40 | μA |
| V _{TIL} | Input Logic Threshold Low | | 0.8 | 1.4 | | V |
| V _{TIH} | Input Logic Threshold High | | | 1.4 | 2 | V |
| SR _T | Transition Slew Rate | T _A = 25°C, V _{CC} = 5V R _L = 3 to 7KΩ, C _L = 50 to 2500pF (Note 1) | 6 | 12 | 30 | V/μs |
| D _R | Data Rate | (Note 2) | 200 | 400 | | Kbits/s |
| R _{TOUT} | Transmitter Output Resistance | V _{CC} = V+ = V- = 0V V _{OUT} = ± 2V | 300 | | | Ω |
| I _{SC} | Transmitter Output Short Circuit Current | one T _{XOUT} to GND | ± 7 | ± 22 | | mA |
| t _{dT} | Propagation Delay Time | TTL-CMOS IN to RS-232 OUT C _L = 150pF (50% to 50%) | | 1.3 | 3.5 | μs |

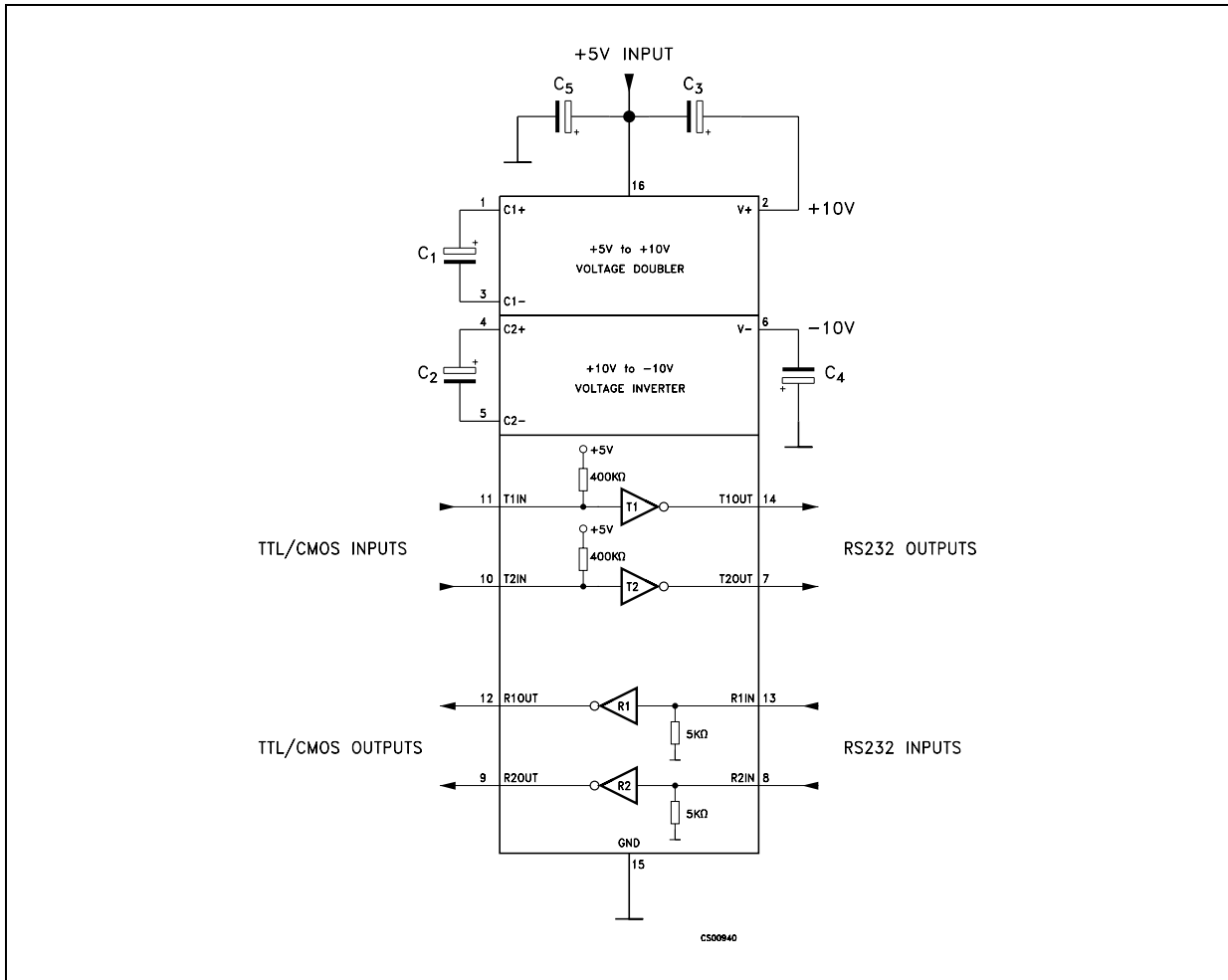
Note 1: Measured from 3V to -3V or from -3V to 3V.

Note2: One transmitter output is loaded with R_L = 3KΩ to 7KΩ, C_L = 50 to 1000pF**RECEIVER ELECTRICAL CHARACTERISTICS**(C₁ - C₄ = 0.1μF, V_{CC} = 5V ± 10%, T_A = -40 to 85°C, unless otherwise specified.Typical values are referred to T_A = 25°C)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------------|--|--|---------|----------------------|------|----------|
| V _{RIN} | Receiver Input Voltage Operating Range | | -30 | | 30 | V |
| R _{RIN} | RS-232 Input Resistance | T _A = 25°C | 3 | 5 | 7 | KΩ |
| V _{RIL} | RS-232 Input Threshold Low | | 0.8 | 1.3 | | V |
| V _{RIH} | RS-232 Input Threshold High | | | 1.8 | 2.4 | V |
| V _{RIHYS} | RS-232 Input Hysteresis | V _{CC} = 5V | 0.2 | 0.5 | 1 | V |
| V _{ROL} | TTL/CMOS Output Voltage Low | I _{OUT} = 3.2mA (to V _{CC}) | | 0.2 | 0.4 | V |
| V _{ROH} | TTL/CMOS Output Voltage High | I _{OUT} = 1mA (to GND) | 3.5 | V _{CC} -0.2 | | V |
| I _{SCR} | Receiver Output Short Circuit Current | to GND to V _{CC} | 2 10 | 10 30 | | mA mA |
| t _{dR} | Propagation Delay Time | C _L = 150pF (Note 1) | | 0.1 | 0.5 | μs |

Note 1: RS-232 IN to TTL-CMOS OUT (from 50% to 50%)

APPLICATION CIRCUITS (note 1, note 2)



Note 1: C₁₋₄ capacitors can even be 1μF ones.
 Note 2: C₁₋₄ can be common or biased capacitors.

CAPACITANCE VALUE (μF)

| C1 | C2. | C3 | C4 | C5 |
|-----|-----|-----|-----|-----|
| 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |

TYPICAL PERFORMANCE CHARACTERISTICS (unless otherwise specified $T_j = 25^\circ\text{C}$)

Figure 1 : Driver Voltage Transfer Characteristics

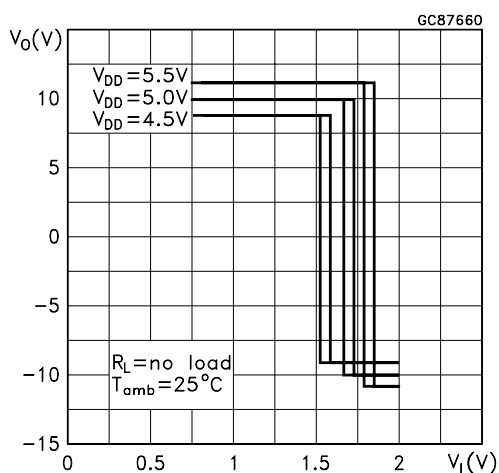


Figure 4 : Driver Output Capability Current vs Output Voltage

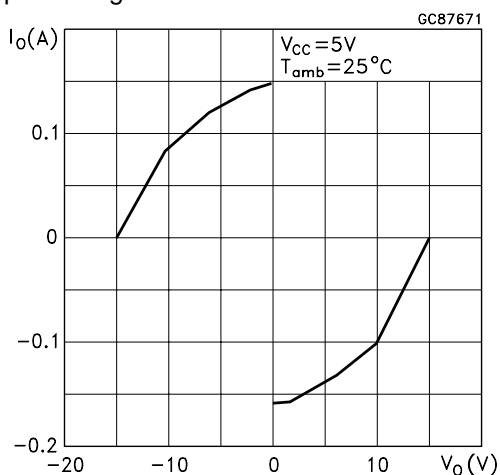


Figure 2 : Drive Short Circuit Output Current vs Temperature

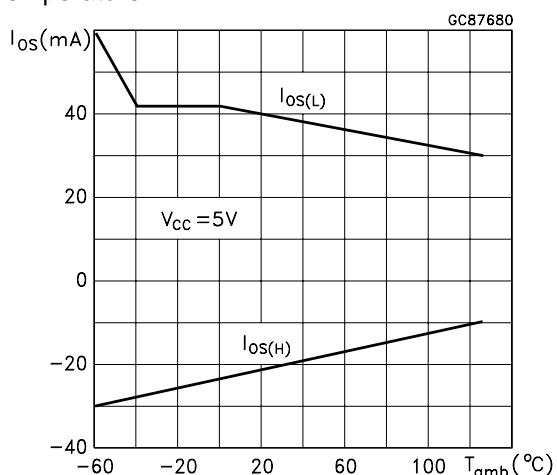


Figure 5 : Driver Short Circuit Supply Current vs Temperature

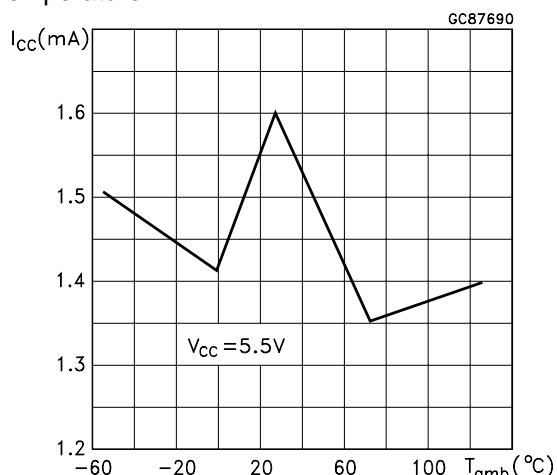


Figure 3 : Receiver Threshold vs Supply Voltage

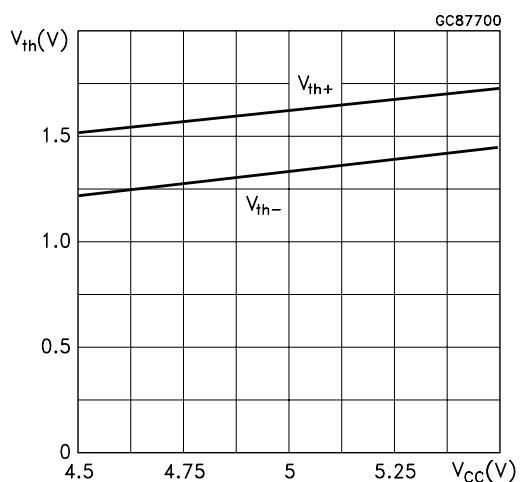
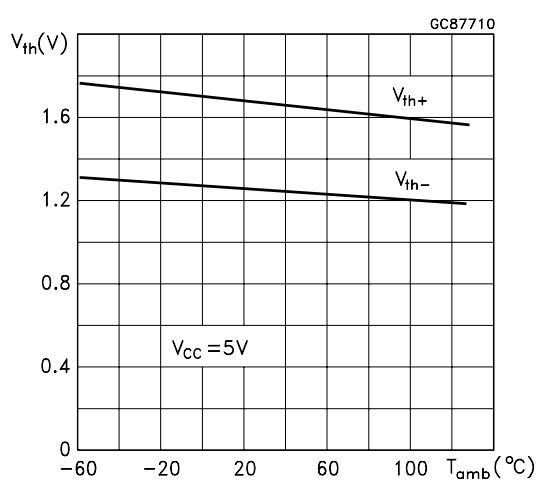
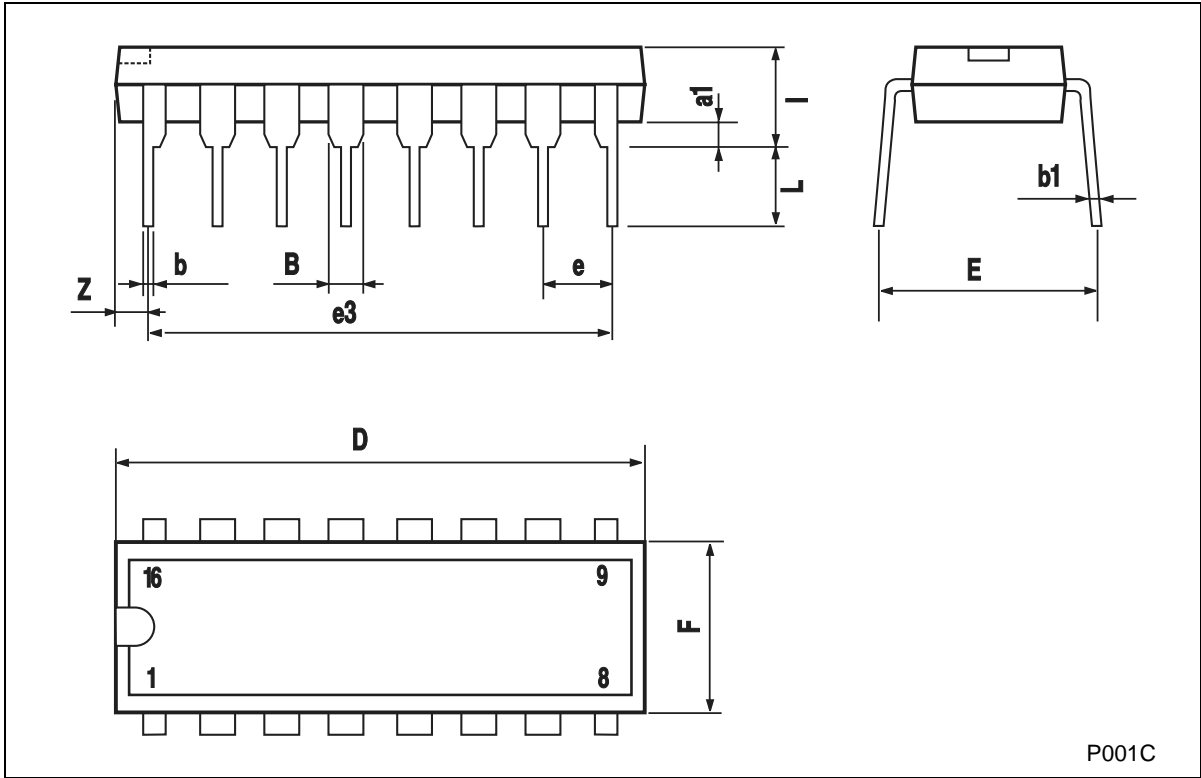


Figure 6 : Receiver Threshold vs Temperature



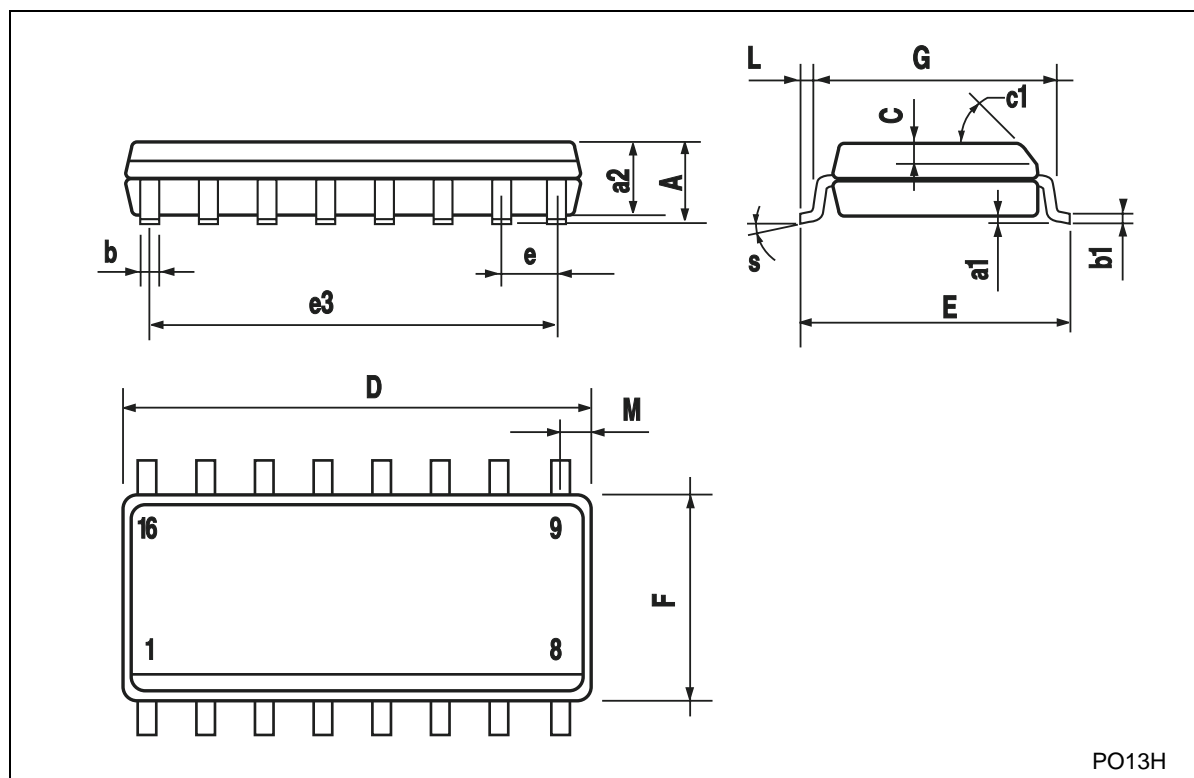
Plastic DIP-16 (0.25) MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|------|-------|------|-------|-------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| a1 | 0.51 | | | 0.020 | | |
| B | 0.77 | | 1.65 | 0.030 | | 0.065 |
| b | | 0.5 | | | 0.020 | |
| b1 | | 0.25 | | | 0.010 | |
| D | | | 20 | | | 0.787 |
| E | | 8.5 | | | 0.335 | |
| e | | 2.54 | | | 0.100 | |
| e3 | | 17.78 | | | 0.700 | |
| F | | | 7.1 | | | 0.280 |
| l | | | 5.1 | | | 0.201 |
| L | | 3.3 | | | 0.130 | |
| Z | | | 1.27 | | | 0.050 |



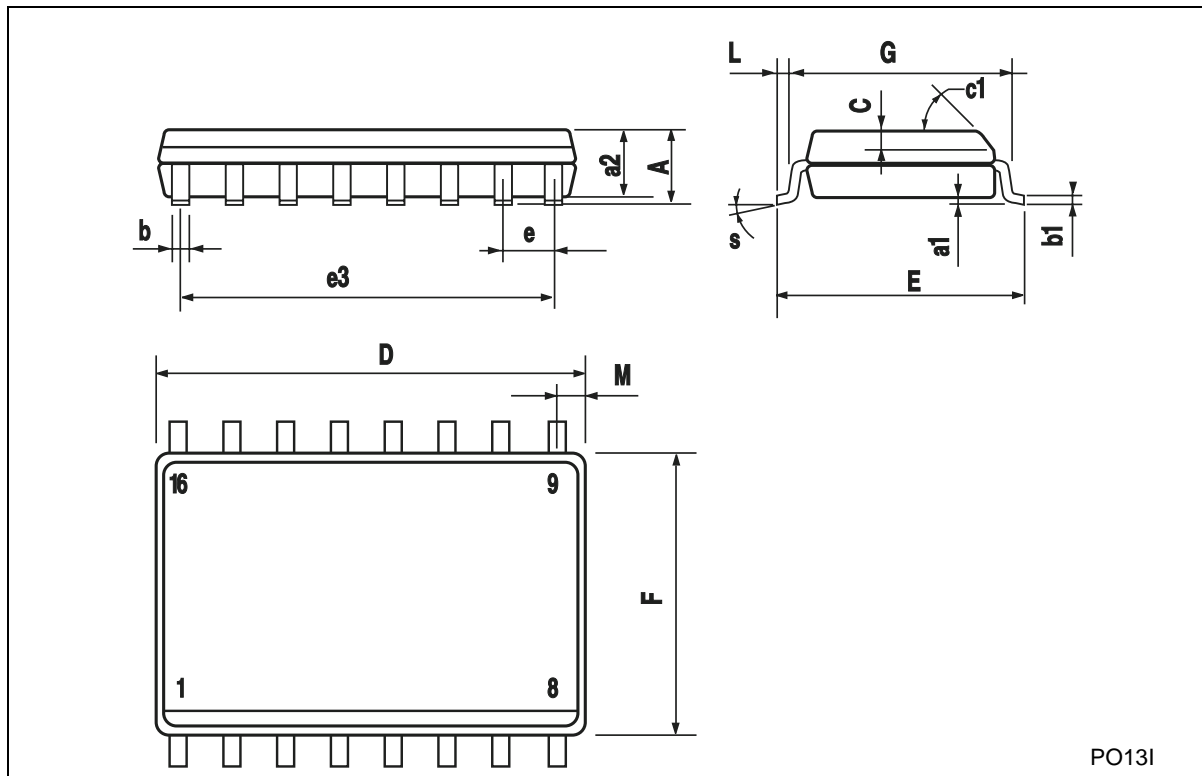
SO-16 MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|------------|------|------|-------|-------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | | | 1.75 | | | 0.068 |
| a1 | 0.1 | | 0.2 | 0.003 | | 0.007 |
| a2 | | | 1.65 | | | 0.064 |
| b | 0.35 | | 0.46 | 0.013 | | 0.018 |
| b1 | 0.19 | | 0.25 | 0.007 | | 0.010 |
| C | | 0.5 | | | 0.019 | |
| c1 | 45° (typ.) | | | | | |
| D | 9.8 | | 10 | 0.385 | | 0.393 |
| E | 5.8 | | 6.2 | 0.228 | | 0.244 |
| e | | 1.27 | | | 0.050 | |
| e3 | | 8.89 | | | 0.350 | |
| F | 3.8 | | 4.0 | 0.149 | | 0.157 |
| G | 4.6 | | 5.3 | 0.181 | | 0.208 |
| L | 0.5 | | 1.27 | 0.019 | | 0.050 |
| M | | | 0.62 | | | 0.024 |
| S | 8° (max.) | | | | | |



SO-16L MECHANICAL DATA

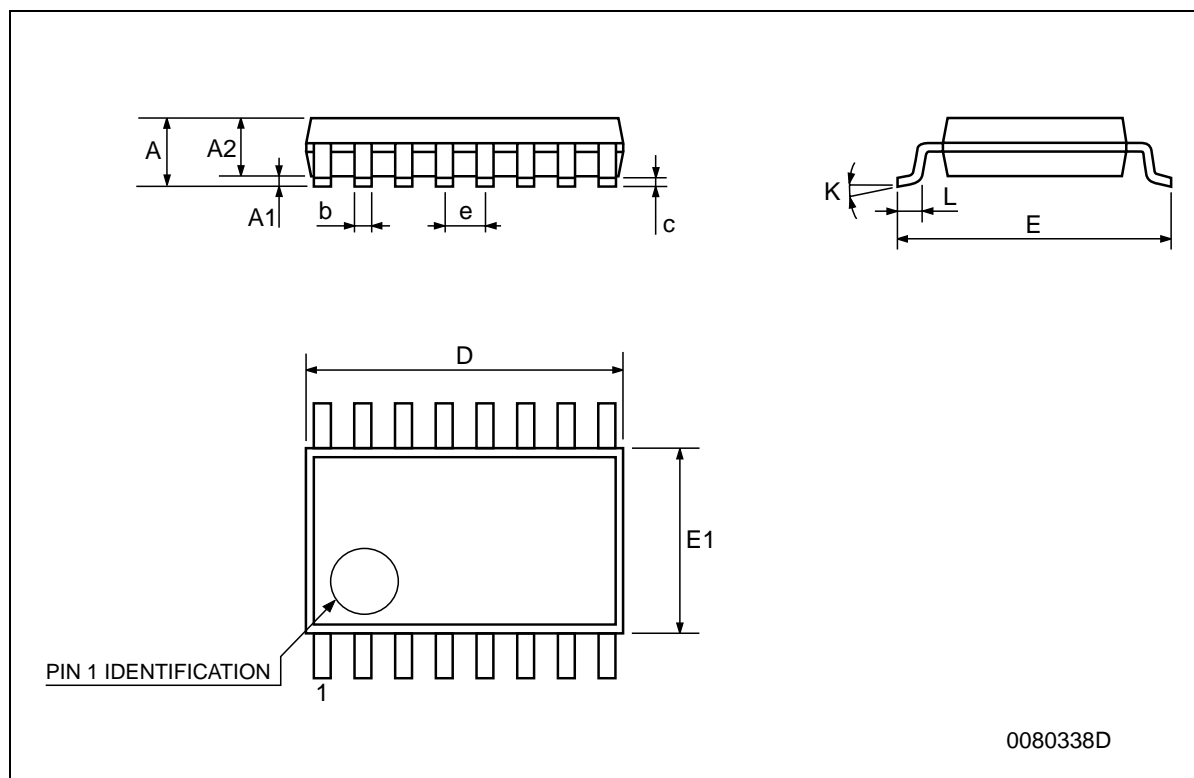
| DIM. | mm. | | | inch | | |
|------|------------|------|-------|-------|-------|-------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | | | 2.65 | | | 0.104 |
| a1 | 0.1 | | 0.2 | 0.004 | | 0.008 |
| a2 | | | 2.45 | | | 0.096 |
| b | 0.35 | | 0.49 | 0.014 | | 0.019 |
| b1 | 0.23 | | 0.32 | 0.009 | | 0.012 |
| C | | 0.5 | | | 0.020 | |
| c1 | 45° (typ.) | | | | | |
| D | 10.1 | | 10.5 | 0.397 | | 0.413 |
| E | 10.0 | | 10.65 | 0.393 | | 0.419 |
| e | | 1.27 | | | 0.050 | |
| e3 | | 8.89 | | | 0.350 | |
| F | 7.4 | | 7.6 | 0.291 | | 0.300 |
| G | | | | | | |
| L | 0.5 | | 1.27 | 0.020 | | 0.050 |
| M | | | 0.75 | | | 0.029 |
| S | 8° (max.) | | | | | |



PO13I

TSSOP16 MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|------|------|----------|------|-------|------------|--------|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | | | 1.2 | | | 0.047 |
| A1 | 0.05 | | 0.15 | 0.002 | 0.004 | 0.006 |
| A2 | 0.8 | 1 | 1.05 | 0.031 | 0.039 | 0.041 |
| b | 0.19 | | 0.30 | 0.007 | | 0.012 |
| c | 0.09 | | 0.20 | 0.004 | | 0.0089 |
| D | 4.9 | 5 | 5.1 | 0.193 | 0.197 | 0.201 |
| E | 6.2 | 6.4 | 6.6 | 0.244 | 0.252 | 0.260 |
| E1 | 4.3 | 4.4 | 4.48 | 0.169 | 0.173 | 0.176 |
| e | | 0.65 BSC | | | 0.0256 BSC | |
| K | 0° | | 8° | 0° | | 8° |
| L | 0.45 | 0.60 | 0.75 | 0.018 | 0.024 | 0.030 |



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